

# Curriculum Vitae – Paul Wedrich PhD FCPS FHEA

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## Academic positions.

since 2021: Professor (permanent, W2), Universität Hamburg, Germany  
2019-2021: Hirzebruch Research Instructor, Max Planck Institute & University of Bonn, Germany  
2017-2019: Postdoctoral Fellow, The Australian National University [ANU], Australia  
2015-2017: Research Associate, Imperial College London, United Kingdom

## Research visits.

2024: Programme “Quantum Symmetries Reunion”, SLMath (2 weeks)  
2020: Programme “Knots, Strings, Symplectic Geometry and Dualities”, Institut Mittag Leffler (remotely)  
2020: Programme “Quantum Symmetries”, MSRI Postdoctoral Fellow (4 months)  
2018: Programme “Quantum Knot Invariants and Supersymmetric Gauge Theories”, KITP (3 weeks)  
2017: Programme “Homology theories in low dimensional topology”, INI, Cambridge  
2016: Max Planck Institute for Mathematics, Bonn (6 months)

## Education.

2012-2015: PhD, University of Cambridge. Advisor: Dr Jacob Rasmussen  
2011-2012: MAST in Mathematics (Part III) with high distinction, University of Cambridge  
2008-2011: BSc in Mathematics with distinction, University of Vienna

## Published / accepted papers.

2022: A Kirby color for Khovanov homology. Joint with Matthew Hogancamp and David Rose. Accepted for publication in *Journal of the European Mathematical Society* (2023). [arXiv:2210.05640](https://arxiv.org/abs/2210.05640).  
2022: Skein lasagna modules and handle decompositions. Joint with Ciprian Manolescu and Kevin Walker. *Advances in Mathematics* 425 (2023) Paper No. 109071. [arXiv:2206.04616](https://arxiv.org/abs/2206.04616).  
2021: Link splitting deformation of colored Khovanov–Rozansky homology. Joint with Matthew Hogancamp and David Rose. Accepted for publication in *Proceedings of the London Mathematical Society* (2023). [arXiv:2107.09590](https://arxiv.org/abs/2107.09590).  
2021:  $SL_2$  tilting modules in the mixed case. Joint with Louise Sutton, Daniel Tubbenhauer, and Jieru Zhu. *Selecta Mathematica* 29-3 (2023) Paper No. 39. [arXiv:2105.07724](https://arxiv.org/abs/2105.07724).  
2021:  $gl(2)$  foams and the Khovanov homotopy type. Joint with Vyacheslav Krushkal. *Indiana University Mathematics Journal* 72-3 (2023) 731–755. [arXiv:2101.05785](https://arxiv.org/abs/2101.05785).  
2020: Tangle addition and the knots-quivers correspondence. Joint with Marko Stosic. *Journal of the London Mathematical Society* 104-1 (2021) 341–361. [arXiv:2004.10837](https://arxiv.org/abs/2004.10837).  
2020: A coupled Temperley-Lieb algebra for the superintegrable chiral Potts chain. Joint with Remy Adderton and Murray T. Batchelor. *Journal of Physics A: Mathematical and Theoretical* 53-36 (2020). [arXiv:2004.10392](https://arxiv.org/abs/2004.10392).  
2020: The center of  $SL(2)$  tilting modules. Joint with Daniel Tubbenhauer. *Glasgow Mathematical Journal* 64 (2022) 165–184. [arXiv:2004.10146](https://arxiv.org/abs/2004.10146).  
2020: Derived traces of Soergel categories. Joint with Eugene Gorsky and Matthew Hogancamp. *International Mathematical Research Notices*, first published online (2021). [arXiv:2002.06110](https://arxiv.org/abs/2002.06110).  
2019: Invariants of 4-manifolds from Khovanov-Rozansky link homology. Joint with Scott Morrison and Kevin Walker. *Geometry & Topology* 26-8 (2022) 3367–3420. [arXiv:1907.12194](https://arxiv.org/abs/1907.12194).

- 2019: Quivers for  $SL(2)$  tilting modules. Joint with Daniel Tubbenhauer. *Representation Theory* 25 (2021) 440-480. [arXiv:1907.11560](#). (6 citations)
- 2019: Evaluations of annular Khovanov-Rozansky homology. Joint with Eugene Gorsky. *Math Z.* 303-25 (2023). [arXiv:1904.04481](#).
- 2019: Algèbre diagrammatique et catégorification. Survey paper. Joint with Hoel Queffelec. *Gazette des mathématiciens* 163 (2020).
- 2018: Khovanov homology and categorification of skein modules. Joint with Hoel Queffelec. *Quantum Topology* 21-1 (2021) 129–209. [arXiv:1806.03416](#).
- 2018: Extremal weight projectors II. Joint with Hoel Queffelec. Accepted for publication in *Algebraic Combinatorics* (2023). [arXiv:1803.09883](#).
- 2017: Rational links and DT invariants of quivers. Joint with Marko Stosic. *International Mathematical Research Notices* 6 (2021) 4169–4210. [arXiv:1711.03333](#).
- 2017: Functoriality of colored link homologies. Joint with Michael Ehrig and Daniel Tubbenhauer. *Proceedings of the London Mathematical Society* 117-5 (2018) 996–1040. [arXiv:1703.06691](#).
- 2017: Extremal weight projectors. Joint with Hoel Queffelec. *Mathematical Research Letters* 25-6 (2018) 1911–1936. [arXiv:1701.02316](#).
- 2016: Exponential growth of colored HOMFLY-PT homology. *Advances in Mathematics* 353 (2019), 471–525. [arXiv:1602.02769](#).
- 2015: Super  $q$ -Howe duality and web categories. Joint with Daniel Tubbenhauer and Pedro Vaz. *Algebraic & Geometric Topology* 17-6 (2017), 3703–3749. [arXiv:1504.05069v2](#).
- 2015: Deformations of colored  $sl(N)$  link homologies via foams. Joint with David Rose. *Geometry & Topology* 20-6 (2016), 3431–3517. [arXiv:1501.02567](#).
- 2014:  $q$ -holonomic formulas for colored HOMFLY polynomials of 2-bridge links. *Journal of Pure and Applied Algebra*. 223-4 (2019), 1434–1439. [arXiv:1410.3769v1](#).
- 2014: Categorified  $sl(N)$  invariants of colored rational tangles. *Algebraic & Geometric Topology* 16-1 (2016), 427–482. [arXiv:1404.2736v1](#).

### Preprints.

- 2021: A skein relation for singular Soergel bimodules. Joint with Matthew Hogancamp and David Rose. [arXiv:2107.08117](#).
- 2024: A braided (infinity,2)-category of Soergel bimodules. Joint with Yu Leon Lio, Aaron Mazel-Gee, David Reutter, and Catharina Stroppel. [arXiv:2401.02956](#).
- 2024: Invariants of surfaces in smooth 4-manifolds from link homology. Joint with Scott Morrison and Kevin Walker. [arXiv:2401.06600](#).
- 2024: Bordered invariants from Khovanov homology. Joint with Matthew Hogancamp and David Rose. [arXiv:2404.06301](#).

### Teaching.

- 2024: Universität Hamburg, research seminar *Quantum Topology and Categorification*.
- 2024: Universität Hamburg, lecture course *Knot homology and categorification*.
- 2023: Universität Hamburg, research seminar *Quantum Topology and Categorification*.
- 2023: Universität Hamburg, ZMP seminar *Knot homology*.
- 2023: Universität Hamburg, proseminar *Symmetrische Funktionen*.
- 2023: Universität Hamburg, lecture course *Algebra*.
- 2023: Universität Hamburg, research seminar *Quantum Topology and Categorification*.
- 2023: Universität Hamburg, graduate seminar *Low-dimensional topology*.
- 2023: Universität Hamburg, lecture course *LASek Mathematik 2*.
- 2022: Universität Hamburg, research seminar *Quantum Topology and Categorification*.
- 2022: Universität Hamburg, graduate seminar *Highest weight categories*.

- 2022: Universität Hamburg, lecture course *LASek Mathematik 1*.
- 2022: Universität Hamburg, graduate seminar *Braids, bimodules, bicategories*.
- 2022: Universität Hamburg, lecture course *Advanced algebra*.
- 2021: Universität Hamburg, lecture course *Lie algebras*.
- 2021: Universität Hamburg, LSV *Beweismethoden und schulnahe Beispiele aus der linearen Algebra*.
- 2020: Universität Bonn, Graduate Seminar S4A2 Representation Theory on *Knot homology*.
- 2019: Universität Bonn, *Oberseminar representation theory*.
- 2018: The Australian National University, lecture course *MATH1013 Linear Algebra*.
- 2016: London Taught Course Centre, intensive course on Khovanov homology.
- 2015: University of Cambridge, supervisor for Part IB Geometry.
- 2014: University of Cambridge, supervisor for Part II Algebraic Topology.
- 2013: University of Cambridge, supervisor for Part IB Geometry.
- 2011: University of Vienna, teaching assistant for 1st year calculus.

### **Supervision of Early-Career Researchers.**

- current Postdocs: Jesse Cohen (since 2023), Universität Hamburg  
 Mikhail Gorsky (from 2024, with Dyckerhoff), Universität Hamburg  
 Laura Marino (from 2024), Universität Hamburg  
 Daria Poliakova (from 2024, with Holstein), Universität Hamburg  
 Kostiantyn Tolmachov (from 2024, with Dyckerhoff), Universität Hamburg
- current PhDs: Leon Goertz (since 2023), Universität Hamburg  
 Isabela Recio (since 2024), Universität Hamburg  
 Karim Ritter von Merkl (since 2023), Universität Hamburg
- since 2022: Second supervisor/mentor for doctoral students: 1/3, Universität Hamburg  
 since 2022: Master theses under supervision/completed: 1/3, Universität Hamburg  
 since 2022: Bachelor theses under supervision/completed: 1/1, Universität Hamburg  
 since 2021: Mentor for Emmy–Noether application (D. Reutter), Universität Hamburg  
 2018: Honours theses/summer research cosupervision: 1/1, The Australian National University  
 2017: MSc thesis supervision, Imperial College London

### **Third-party funding.**

- since 2024: PI, management committee member, and diversity officer of the Collaborative Research Center 1624 “Higher structures, moduli spaces and integrability”, Universität Hamburg.
- since 2023: International PI in the SPARC project “Knots, quivers, and beyond” with Rama Mishra, Pichai Ramadevi, and Johannes Walcher.
- since 2021: Member and PI of the Excellence Cluster “Quantum Universe”, Universität Hamburg.  
 2019: Discovery Early Career Researcher Award (declined), Australian Research Council, 427k AUD. Project title “Homology theories in quantum topology”. Highly competitive across disciplines, maximal funding amount secured, one of only two pure mathematics projects funded in 2019.

### **Contributions to event organisation.**

- 2024: International mathematics competition “Naboj”, Hamburg.
- 2022: Minisymposium “Algebra and Low-Dimensional Topology”, DVM Annual Meeting, Berlin.
- 2020: Workshop “Categorification, Hall algebras and quantum cohomology” and learning seminar series, Hausdorff Institute for Mathematics, Bonn.
- 2020: Felix Klein Lectures 2020, Hausdorff Center for Mathematics, Bonn.
- 2019: Workshop (2 weeks) “Categorification in quantum topology and beyond” at the Erwin Schrödinger Institut [ESI], Vienna.

2018: Conference “Classical and quantum three-manifold topology” at Monash University.

2017: Junior Trimester Programme “Symplectic Geometry and Representation Theory”, HIM, Bonn.

### **Community, department and university service.**

since 2024: Member of the management committee of the Collaborative Research Center 1624.

since 2023: Equal opportunity representative at the department of Mathematics.

since 2022: ERASMUS international exchange coordinator at the department of Mathematics.

since 2022: Editor for *Abhandlungen aus dem mathematischen Seminar der Universität Hamburg*.

since 2022: Member of hiring committees for one W2, two W3 and three W1 positions.

2020: Research group leader in the Junior Trimester Programme “New Trends in representation theory”, HIM, Bonn.

2019-2020: Member of the board of the Mathematical Institute, University of Bonn.

Representative of the non-professorial scientific staff.

2018-2019: Member of the Early Career Academic Development Committee, College of Science, ANU.

Representative of the Mathematical Sciences Institute.

2018-2019: Development of the ECRVP funding scheme at the Mathematical Sciences Institute, ANU.

2018-2019: Organiser of the Mathematical Sciences Institute Colloquium at ANU.

### **Professional memberships.**

since 2021: Member of the German Mathematical Society

since 2018: Fellow of the Higher Education Academy

since 2018: Member of the Australian Mathematical Society

since 2018: Member of the ANU Ally Network for LGBTIQ\* inclusion

since 2014: Member of the London Mathematical Society

since 2013: Fellow of the Cambridge Philosophical Society

### **Refereeing.**

I currently review around ten papers per year. In the past years I was a referee for:

- *Advances in Mathematics*
- *Algebraic & Geometric Topology*
- *Algebras and Representation Theory*
- *Annals of Representation Theory*
- *Annales scientifiques de l'École normale supérieure*
- *Arkiv för Matematik*
- *Communications in Mathematical Physics*
- *Compositio Mathematicae*
- *Crelle's Journal*
- *Duke Mathematical Journal*
- *Inventiones Mathematicae*
- *Fundamenta Mathematicae*
- *Geometry & Topology*
- *International Mathematical Research Notices*
- *International Symposium on Comp. Geometry*
- *Journal for Pure and Applied Algebra*
- *Journal of Combinatorial Algebra*
- *Journal of Knot Theory and its Ramifications*
- *Journal of the LMS*
- *Journal of Topology*
- *Letters in Mathematical Physics*
- *Mathematische Annalen*
- *Mathematische Zeitschrift*
- *Michigan Mathematical Journal*
- *Notices of the AMS*
- *Pacific Journal of Mathematics*
- *Proceedings of the LMS*
- *PLOS ONE*
- *Quantum Topology*
- *SIGMA*
- *Transformation Groups*

In the recent past I have also served as referee for the ARC and the NSF.

### **Awards, honours, and offers.**

2022: Lecturer of the semester (summer semester 22), Department of Mathematics, Universität Hamburg

2019: Lectureship at the University of Essex, UK (declined)

2014: Smith-Knight & Rayleigh-Knight Prize

- 2012: Scholarship at Churchill College, Cambridge  
 2012: High distinction in Cambridge Part III exams, offered PhD position without prior application  
 2011: Excellence Award (10k EUR) from the Carinthian branch of the Federation of Austrian Industry  
 2011: Excellence scholarships, ranked 1st in Mathematics at Universität Wien in final two years

### **Selected conference talks and lecture series.**

- 2024: Programme “Quantum Symmetries Reunion”, SLMath  
 Conference “Diagrammatic Intuition and Deep Learning in Mathematics”, University of York  
 Simons Semester “Knots, homologies, and physics”, Warsaw  
 Conference “Quantum Topology Biennial: Representation Theory”, Les Diablerets
- 2023: Quantum Universe Lecture Series “Correlators, topological field theory and categorification”  
 Spring School in Representation Theory, lecture series, University of Kent  
 Workshop “Algebra, geometry, and combinatorics of link homology”, AIM
- 2022: Conference “Recent developments in link homology theories”. Les Diablerets, online  
 Conference “From Subfactors to Quantum Topology – in Memory of Vaughan Jones”, Geneva  
 Conference “QUACKS II”. University of Oregon  
 DMV Annual Meeting 2022, Topology and Geometry Section, Berlin
- 2021: Workshop: “Foam Evaluation”, ICERM  
 Conference: “HCM Symposium”, Hausdorff Center for Mathematics, Universität Bonn  
 Mini-course at Workshop: “Perspectives on quantum link homology theories”, Regensburg  
 Georgia Topology Conference 2021, online  
 Workshop: “Perspectives on Knot Homology”, Banff International Research Station, online
- 2020: Workshop: QUAntum groups, Categorification, Knot invariants, and Soergel bimodules, online  
 Categorification Learning Seminar: Two talks on “Derived annular Khovanov-Rozansky invariants”  
 Workshop: “Soergel Bimodules and Categorification of the Braid Group”, ICERM
- 2019: Conference: “Mathematics and Physics of Knots”, Institute Mittag Leffler  
 Conference: “Hilbert schemes, categorification and combinatorics”, UC Davis  
 Workshop mini-course: “Quantum Topology and hyperbolic geometry III”, Quy Nhon, Vietnam  
 Conference: “Quantum Topology and hyperbolic geometry III”, Da Nang, Vietnam  
 Workshop: “Hidden Algebraic Structures in Topology”, Caltech  
 Conference: “Aspects of Higher Representation Theory”, Brussels.
- 2018: Mini-course at Workshop “Classical and quantum three-manifold topology”, Monash University.  
 Workshop “Categorified Hecke algebras, link homology and Hilbert schemes”, AIM  
 Conference “Interactions of low-dimensional topology and higher representation theory”, Zürich  
 Conference “Categorification and Higher Representation Theory”, Institute Mittag Leffler  
 Meeting: “Topological Quantum Field Theory and Categorification”, IESC  
 Workshop: “Categorification in mathematical physics” SCGP Stony Brook  
 Workshop: “Modular Forms and Quantum Knot Invariants”, Banff International Research Station  
 Conference: “Quantum Knot Homology and Supersymmetric Gauge Theories”, Aspen
- 2017: Conference: “Representation Theory and Combinatorics of Torus Links”, University of Massachusetts  
 Workshop: “Quantum topology and categorified representation theory”, Isaac Newton Institute  
 Workshop: “Physics and knot homologies”, Isaac Newton Institute
- 2016: Conference: “Quantum invariants and low-dimensional topology”, MATRIX, Australia  
 ESI Simons Lecture Series, Erwin Schrödinger Institut, Vienna  
 Workshop: “Homological Methods in Algebra and Geometry”, AIMS Ghana  
 Conference: “Knots in Hellas”, Greece (keynote talk)  
 Conference: “SwissMAP”, Switzerland
- 2015: Workshop: “Physics and mathematics of knot homologies”, SCGP Stony Brook  
 Conference, “Winter Braids V”, France

**Seminar talks.**

- 2024: Paris
- 2023: Higher Structures & Field Theory (online)  
Stanford University  
UC Berkeley  
UC Davis  
Université catholique de Louvain
- 2022: Beijing Institute of Technology  
TU Dresden  
Universität Hamburg  
University of Virginia
- 2021: Boston College  
CUNY Medgar Evers  
Institut de Mathématiques de Jussieu  
Universität Göttingen  
Universität Hamburg
- 2020: George Washington University  
Kansas State University  
LA Topology Seminar  
MSRI (2x)  
Paris LAGA/IMJ-PRG  
Stanford University  
UC Berkeley  
UC Davis  
University of Birmingham  
University of Massachusetts, Amherst
- 2019: Australian National University (2x)  
IST Lisbon  
Montana State University  
Technische Universität Kaiserslautern  
Universität Bielefeld  
University of Essex  
Universität Hamburg  
University of Leicester  
Université de Montpellier  
University of Oklahoma  
Universität Stuttgart  
Universität Wien  
Universität Zürich (2x)
- 2018: Australian National University  
Claremont Topology Seminar  
Melbourne University  
Monash University  
TU München  
UC Santa Barbara  
Uppsala Universitet
- 2017: Australian National University  
Kings College London  
IST Lisbon  
QGM Aarhus University  
University College London University of Cambridge  
University of Sydney  
Universität Wien  
Universität Zürich
- 2016: Université de Montpellier  
Université catholique de Louvain  
University of Oregon  
Universität Wien  
Universität Bonn  
Max Planck Institut für Mathematik
- 2015: California Institute of Technology  
Columbia University  
Université catholique de Louvain  
ETH Zürich  
Durham University  
QGM Aarhus University
- 2014: Institut de Mathématiques de Jussieu  
Université de Genève  
QGM Aarhus University  
Erwin Schrödinger Institut  
University of Cambridge
- 2013: University of Cambridge  
Universität Wien
- 2012: IST Austria  
Universität Bonn

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